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10/092,949	03/08/2002	Atsushi Umeda	Q68893	7381

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EXAMINER

NGUYEN, LAM S

ART UNIT

PAPER NUMBER

2853

DATE MAILED: 05/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/092,949

Applicant(s)

UMEDA ET AL.

Examiner

LAM S NGUYEN

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 February 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6, 8, 12-16, 21, 22 and 26-29 is/are rejected.
- 7) ☒ Claim(s) 7, 9-11, 17-20, 23-25 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 June 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 21 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 21, a plurality of nozzles and corresponding piezoelectric elements are not included in the head driving apparatus. However, since the head driving apparatus as set forth in any one of claims 1-20, the head driving apparatus should include a plurality of nozzles and corresponding piezoelectric elements as claimed in claim 1. Therefore, the claim is unclear for determining the structure of the head driving apparatus.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-4, 22, and 27-29 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakazawa et al. (WO97/32728)\*.

\* Nakazawa et al. (US 6174038) has been provided only as an English language translation of O97/32728 and for purpose of clarity sections of the translation will be referred to in this rejection. However the examiner emphasizes that it is WO97/32728 and not US 6174038 which is the prior art utilized in this rejection.

Nakazawa et al. disclose a head driving apparatus, incorporated in an inkjet printer which comprises:

a print head (FIG. 1, element 30), provided with a plurality of nozzles (FIG. 3, element 11);

piezoelectric elements (FIG. 7, element 30), each associated with one of the nozzles and provided with a drive electrode (FIG. 7, elements 10-1 to 10-n) and a common electrode (FIG. 7, elements 8-1 to 8-n); and

a head driver (FIG. 1, element 190), which generates a drive signal for driving the piezoelectric elements, and selectively supplies the drive signal to at least one of the piezoelectric elements to eject an ink droplet from at least one associated nozzle, the head driving apparatus comprising.

a bias power source (FIG. 7, element 190a), which applied a bias voltage having a predetermined potential to the common electrode of each piezoelectric element.

**Referring to claim 2:** wherein the potential of the bias voltage is variable (FIG. 7: the voltage is varied by the controlling of signal Tp).

**Referring to claim 3:** wherein the bias power source is provided as a logic power source (FIG. 7: the power source 109a is controlled by a logic signal Tp).

**Referring to claim 4:** wherein the bias power source generates the bias voltage based on a power supplied from a power source for driving the print head (FIG. 7: the emitter of the transistor Q1 is connected to the power supply).

#### ***Claim Rejections - 35 USC § 103***

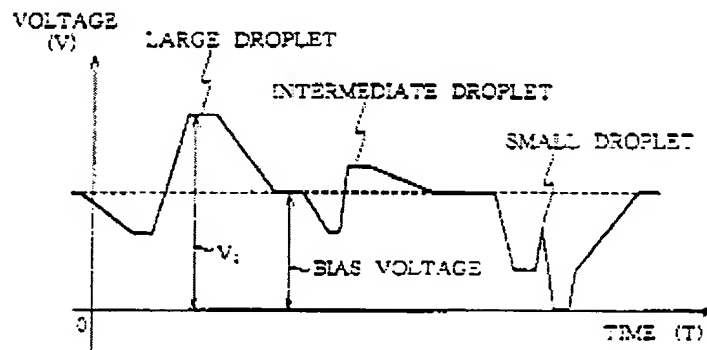
The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 16 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakazawa et al. (WO97/32728) in view of Araki (US 6312077).

Nakazawa et al. disclose the claimed invention as discussed above except that wherein the bias power source is provided as a reference voltage generator which applies a reference voltage having a potential which is substantially identical with an intermediate potential of the drive signal, to the common electrode.



Araki discloses a printing apparatus including a bias power source provided as a reference voltage generator that applies a reference voltage having a potential substantially identical with an intermediate potential of the drive signal (FIG. 11a-b).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to modify the bias power source disclosed by Nakazawa et al. to provide a voltage that is substantially identical to an intermediate potential of the drive signal as disclosed by Araki. The motivation of doing so is to discharge a fine ink

droplet at a high speed in order to improve the image quality of the printing system as taught by Araki (column 4, line 2-5).

3. Claim 5-6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakazawa et al. (WO97/32728) in view of Katsurai et al. (US 4679053).

Nakazawa et al. disclose the claimed invention as discussed above except that wherein the bias power source includes a condenser (or a first condenser) and a constant-voltage circuit (or a charger) which applies the bias voltage to the condenser (**Referring to claims 5, 8**), and wherein the constant-voltage circuit includes a Zener diode electrically connected to the head driving power source through the current limiting resistance and electrically connected to the common electrode through the coupling element, a current limiting resistance, and a coupling element (**Referring to claim 6**).

Katsurai et al. disclose a bias power supply for a printhead wherein the bias power source includes a condenser (FIG. 4, element C), and a constant-voltage circuit (FIG. 4, elements Q1, R5, ZD, U, R1-3, and VR), which applies the bias voltage to the condenser (**Referring to claims 5, 21/5**), and wherein the constant-voltage circuit includes a Zener diode (FIG. 4, element ZD) electrically connected to the head driving power source (FIG. 4, element +V) through the current limiting resistance (FIG. 4, element R5) and electrically connected to the common electrode through the coupling element (FIG. 4, elements U and Q1), a current limiting resistance (FIG. 4, element R5), and a coupling element (FIG. 4, elements Q1 and U) (**Referring to claims 6, 21/6**).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to include the condenser, the Zener diode, and the coupling element as disclosed by Katsurai et al. into the bias voltage power source

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disclosed by Nakazawa et al. The motivation of doing so is to obtain a certain recording density by controlling a driving electric power which is applied to recording elements in order to increase the printing quality as taught by Katsurai et al. (column 2, line 50-63).

4. Claims 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakazawa et al. (WO97/32728) in view of Araki (US 6312077) and Katsurai et al. (SU 4679053).

Nakazawa et al. disclose the claimed invention as discussed above except that wherein the bias voltage is substantially identical with an intermediate potential of the drive signal and wherein the bias power source includes a first condenser, which applies the bias voltage to the common electrode and a charger including a switcher as a switching element controlled in accordance with drive signal (**Referring to claim 13-15, 21/13-15**), which charges the condenser based on a power supplied from a power source for driving the print head.

However, Araki discloses a printing apparatus including a bias voltage is substantially identical with an intermediate potential of the drive signal (FIG. 11a-b).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to modify the bias power source disclosed by Nakazawa et al. to provide a voltage that is substantially identical to an intermediate potential of the drive signal as disclosed by Araki. The motivation of doing so is to discharge a fine ink droplet at a high speed in order to improve the image quality of the printing system as taught by Araki (column 4, line 2-5).

In addition, Katsurai et al. disclose a bias power supply for a printhead wherein the bias power source includes a first condenser (FIG. 4, element C), which applies the

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bias voltage to the common electrode and a charger (FIG. 4, elements Q1, R5, ZD, U, R1-3, and VR) including a switcher as a switching element (FIG. 4, element Q1) controlled in accordance with drive signal (FIG. 4: Q1 is controlled in accordance to the voltage divided by the bridge resistors R1-3 and VR wherein the value of VR is varied in accordance to the data in PIO element) ,which charges the condenser based on a power supplied from a power source for driving the print head.

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to include the first condenser and the charger as disclosed by Katsurai et al. into the bias voltage power source disclosed by Nakazawa et al. The motivation of doing so is to obtain a certain recording density by controlling a driving electric power which is applied to recording elements in order to increase the printing quality as taught by Katsurai et al. (column 2, line 50-63).

***Allowable Subject Matter***

5. Claims 7, 9-11, 17-20, 23-25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

**Referring to claim 7:** The most pertinent arts Nakazawa et al. (WO97/32728), Katsurai et al. (US 4679053), Stevenson, Jr. (US 4126867), Araki (US 6312077), and Osawa et al. (US 6106091) fail to disclose wherein the constant-voltage circuit includes a discharging diode electrically connected to the head driving power source in parallel with the current limiting resistance, such that a current is flowed to the head driving power source through the discharging diode. Therefore, the claimed invention is not disclosed by the cited prior arts.



**Referring to claim 17:** The most pertinent arts Nakazawa et al. (WO97/32728), Katsurai et al. (US 4679053), Stevenson, Jr. (US 4126867), Araki (US 6312077), and Osawa et al. (US 6106091) fail to disclose further comprising the reference voltage generator includes a voltage holder, which latches an arbitrary potential of the drive signal based on the charge signal and an current amplifier, which current-amplifies a voltage output from the voltage holder. Therefore, the claimed invention is not disclosed by the cited prior arts.

**Referring to claim 23:** The most pertinent arts Nakazawa et al. (WO97/32728), Katsurai et al. (US 4679053), Stevenson, Jr. (US 4126867), Araki (US 6312077), and Osawa et al. (US 6106091) fail to disclose further the comprising the step of charging at lest one of piezoelectric elements when the drive signal is not used for ejecting the ink drop. Therefore, the claimed invention is not disclosed by the cited prior arts.

**Referring to claims 18 and 24:** The most pertinent arts Nakazawa et al. (WO97/32728), Katsurai et al. (US 4679053), Stevenson, Jr. (US 4126867), Araki (US 6312077), and Osawa et al. (US 6106091) fail to disclose wherein the reference voltage generator discharges at least one of the piezoelectric elements when a potential of the drive signal is higher than the intermediate potential while a printing operation is performed; and the reference voltage generator charges at least one of the piezoelectric elements when the potential of the drive signal is lower than the intermediate potential while the printing operation is performed. Therefore, the claimed invention is not disclosed by the cited prior arts.

**Referring to claims 9-11, 19, and 20:** Allowable since their dependence on the allowable claims 7, 17, and 18.

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**Referring to claim 25:** The most pertinent arts Nakazawa et al. (WO97/32728), Katsurai et al. (US 4679053), Stevenson, Jr. (US 4126867), Araki (US 6312077), and Osawa et al. (US 6106091) fail to disclose further comprising the step of varying a potential of the bias voltage so as to follow a potential of the drive signal when the drive signal is not used for ejecting the ink drops. Therefore, the claimed invention is not disclosed by the prior arts.

***Response to Arguments***

Applicant's arguments with respect to claims 1, 22, 27-29 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***


Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAM S NGUYEN whose telephone number is (703)305-3342. The examiner can normally be reached on 7:00AM - 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, RUSS ADAMS can be reached on (703)308-3847. The fax phone numbers for the organization where this application or proceeding is assigned are (703)305-3431 for regular communications and (703)305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

LN

May 4, 2003

  
JUDY NGUYEN  
PRIMARY EXAMINER